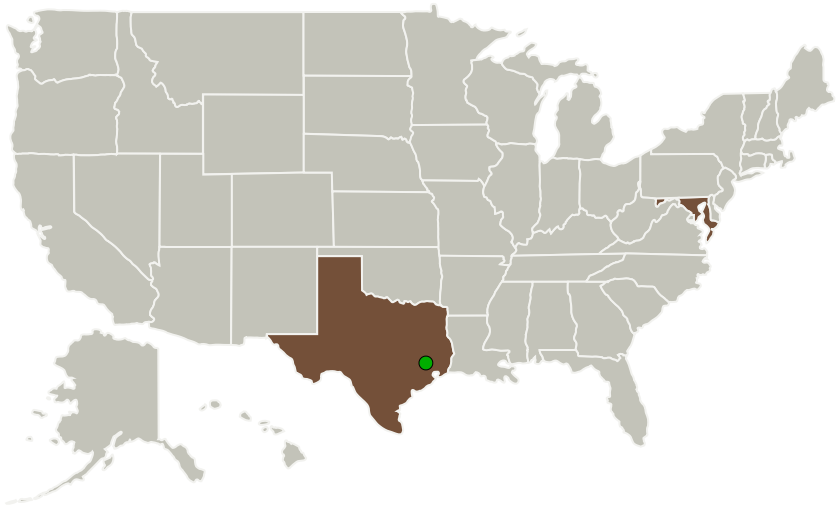
Novel Ultra-Miniature Flexible Videoscope for On-Orbit NDE, Phase I

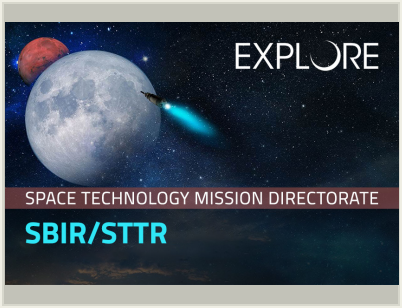
Completed Technology Project (2011 - 2011)

Project Introduction

Conventional videoscopes for NDE suffer many shortcomings, including large diameter, limited flexibility, inadequate image quality, high cost and lack of 3D imaging capability. The primary objective of this SBIR is to demonstrate the feasibility of a novel ultra-miniature flexible videoscope (UMFV) that could eliminate all above-mentioned drawbacks and acquire high resolution video image (mega-pixel images at a rate of 30 frames per second), with an ultra-miniature size (~ 1~2 mm in diameter) for NASA's on-orbit NDE applications. Innovations of the UMFV include: ↓ Ultra miniature size: it is possible to make the entire videoscope probe diameter ~ 1 mm; ↓ High resolution images at video rate: images with mega-pixels can be acquired at 30 fps speed; ↓ Full color images: red, green and blue colors of the object surface can be obtained; ↓ Flexibility of the probe: the UMFV uses only a few fibers and can be made very thin and flexible; ↓ Wider selection of spectral ranges: UMFV design is applicable to UV (<400nm), visible (400 ~ 700 nm), or near infrared (700 ~1100 nm) spectral ranges; ↓ Dynamic control of image resolution and field of view(FOV): By controlling the speed, magnitude, and pattern of scanning, image resolution and FOV can be dynamically adjusted ↓ 3D imaging capability: An unprecedented ability is simultaneous 2D/3D surface image generation. ↓ SWaP: The UMFV's structure design is ideal to meet stringent requirements on size, weight, power (SWaP) for various space applications - We expect to see at least a 10x SWaP reduction.

Primary U.S. Work Locations and Key Partners





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Completed Technology Project (2011 - 2011)

Organizations Performing Work	Role	Type	Location
Xigen, LLC	Lead Organization	Industry	Rockville, Maryland
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Maryland	Texas

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138381)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Xigen, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Jason Geng

Co-Investigator:

Jason Geng

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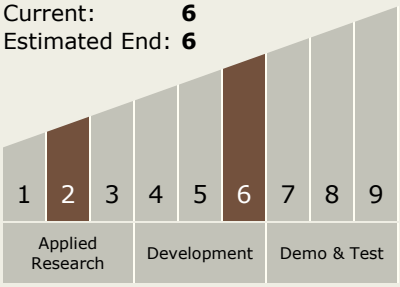
Completed Technology Project (2011 - 2011)

Technology Maturity (TRL)

Start: **2**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.5 Nondestructive Evaluation and Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System